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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to high sensitivity, the electrophotographic photoreceptor which has high definition, and the electrophotography device using it with high resolution.
[0002]
[Description of the Prior Art]C.F. It is a sex instancy, and since high quality and a highly preservable picture are acquired, by recent years, the electrophotographic technology by invention of Carlson does not remain in the field of a copying machine, but also in the field of various printers and a facsimile, it is used widely and shows big breadth.
[0003]About the photo conductor used as the core of electrophotographic technology.As the photoconducting material, the photoconducting material of inorganic systems, such as Se, an As-Se alloy, CdS, ZnO, is used from the former, and these days, With the inorganic system photoconducting material, the photo conductor which uses the photoconducting material of the organic system which has an advantage which is not seen is developed -- since it is pollution-free and membrane formation is easy, a manufacturing cost can be reduced. What is called a lamination type photo conductor that laminated the charge generating layer which comprises a substance which has a high charge generating function, and the charge transport layer which comprised a substance which has a high charge transport function is one of the photo conductors using such an organic system photoconducting material. It can obtain higher sensitivity, and since the function is limited on each layer, the selection range of material is wide, safety is high, since manufacture by spreading is possible for this lamination type photo conductor, productivity is high [a photo conductor], and it is advantageous also in respect of the cost price. From these Reasons, said lamination type photo conductor becomes in use [a photo conductor] now, and is produced in large quantities.

[0004]The conventional white light is replaced with digitization of picture information, etc. in recent years, Exposing a photosensitive layer by the semiconductor laser beam or LED array light which makes respectively a semiconductor laser or an LED (Light Emitting Diode) array an exposure light source, and recording picture information is performed. Now, a 780 nm near infrared and the 650-nm source of red light are most often used as an exposure light source of a photosensitive layer.

[0005]When using picture information directly as a computer output, the digitized picture information, When it is recorded by the print-out of the computer changed into the lightwave signal on a photo conductor and the picture of a manuscript is inputted as information by it, after the picture of a manuscript is read as light information and changed into digital electric signals, again, it is changed into a lightwave signal and recorded on a photo conductor by the lightwave signal. In any case, picture information is recorded on a photosensitive layer by the minute light spot irradiated by the photosensitive layer from an optical recording head, a record optical system, etc., and is developed by developing the portion with which the light spot on a photosensitive layer was irradiated by a toner. A picture is expressed by the set and arrangement of a minute dot which are called the pixel developed by the toner. Therefore, in the optical recording head and the record optical system, it is high-density, and since picture information is recorded, high-resolution-ization is advanced so that the minutest possible spot can be formed.

[0006]About the optical system which records picture information on a photosensitive layer, the variable spot laser recording mode (O plus E May, 1996), the multi-laser beam recording mode, ultraprecise, an ultra high-speed polygon mirror (Japan Hardcopy'96 collected papers), etc. are developed. As a result, picture information is recordable on a photosensitive layer according to an optical system now with the storage density more than 1200dpi (dotper inch: dot number per inch). Thus, even if the optical system which records picture information on a photosensitive layer with high density is developed, it is not necessarily easy to record with sufficient reproducibility on a photosensitive layer by making picture information into an electrostatic latent image. A laser beam is because light intensity distribution has the feature that the Gaussian distribution for which a center section has breadth in a periphery more strongly is shown. Since negatives were exposed and developed in the high sensitivity former electrophotographic photoreceptor also to the light which spread in the periphery, the dot spread and high-definition-izing was difficult.

[0007]As an organic system material which has sensitivity to the above long wavelength light, a SUKUARIKKU acid methine system pigment, an indoline system pigment, cyanine dye, a kinky thread RIUMU system pigment, a polyazo system pigment, a phthalocyanine system pigment, a naphthoquinone system pigment, etc. are known from the former. Although long-wavelength-izing is possible for a SUKUARIKKU acid methine system pigment, an indoline

system pigment, cyanine dye, and a kinky thread RIUMU system pigment, practical stability, such as the characteristic, is repeatedly missing, a polyazo system pigment has disadvantageous long-wavelength-izing also in [it is difficult and] manufacture, and the actual condition is that a naphthoquinone system has difficulty in sensitivity.

[0008]Among phthalocyanine system pigments, in the photo conductor using a metal-phthalocyanines compound, although a sensitivity peak is changed with the central metal, it is known that all are in the long wavelength side comparatively with 700-750 nm. In recent years, research of the oxo titanylphthalocyanine which shows high sensitivity also in these phthalocyanines is done energetically. At least oxo titanylphthalocyanine is classified into many crystal forms from the difference in the angle of diffraction of an X diffraction spectrum as given in the Society of Electrophotography of Japan, the 32nd volume, No. 3, and p282.

[0009]The electrophotographic photoreceptor using two or more sorts of phthalocyanines is examined for the purpose of high-sensitivity-izing near 780mn which is a luminous wavelength of a semiconductor laser. On the patent number No. 2780295 Descriptions, the photo conductor which used the constituent of oxo titanylphthalocyanine and non-metal phthalocyanines is proposed in the mix crystal of oxo titanylphthalocyanine and non-metal phthalocyanines, and the registration-of-patent No. 2754739 gazette. However, since these high sensitivity photo conductors are high sensitivity and they are exposed and developed also to the light which spread in the periphery as mentioned above also to weak exposure, high resolution is unrealizable. As a photo conductor which mixes two sorts of phthalocyanines, the patent number No. 3005052 Description is still insufficient, although the photo conductor which mixes specific crystal form oxo titanylphthalocyanine and non-metal phthalocyanines is proposed and there is an effect of some resolution improvement.

[0010]

[Problem(s) to be Solved by the Invention]As a means for realizing high resolution, the sensitivity to the light of a laser beam periphery is dropped as mentioned above, only light with a powerful center section is exposed using a low sensitivity photo conductor, and faithful dot formation is performed. According to such a means, a low speed printer is enough, but. In progress of improvement in the speed, since said photo conductor is low sensitivity, problems, like that a high power semiconductor laser is needed especially that rest potential becomes high notably at the time of low temperature, and image density falls in the process of reversal development have occurred. Thus, it is the actual condition that high sensitivity and high resolution cannot be reconciled.

[0011]In the photo conductor used for the electrophotography device which forms a picture by the process of reversal development especially. Since the defect by the fogging called the black dot which is a minute sunspot will occur and image quality will deteriorate if the electric charge on the surface of a photo conductor decreases by factors other than exposure, in order

to reduce such an image defect, the under-coating layer is provided. There are a photo conductor which oxidized the conductive substrate surface and specifically formed the alumite layer as an electric charge blocking layer between the conductive substrate and the photosensitive layer, and a photo conductor in which the under-coating layer was formed. Since there is a problem that productivity worsens and the cost price becomes high in order to oxidize a conductive substrate, the photo conductor in which the alumite layer was formed is examined forming an under-coating layer in comparatively many cases. However, when an under-coating layer is formed, there is a problem that the sensitivity of a photo conductor falls.
[0012]The publicly known photo conductor of attaining high sensitivity, high definition, and high resolution is still above conventionally insufficient in characteristic, and the further improvement is desired.
[0013]The purpose of this invention is to provide the electrophotographic photoreceptor with which it is satisfied of all high sensitivity, the high definition, and high resolution, and the electrophotography device using it.
[0014]
[Means for solving problem]This invention is an electrophotographic photoreceptor characterized by comprising the following, and a photosensitive layer, In the X diffraction spectrum over CuKalpha characteristic X ray (wavelength: 1.54A), by a bragg angle (2theta**0.2 degree). The electrophotographic photoreceptor containing the crystalline phthalocyanine composition which has a peak in at least 7.0 degrees, 7.6 degrees, 9.0 degrees, 13.6 degrees, 16.8 degrees, and 27.2 degrees.
Conductive substrate.
The photosensitive layer formed on the conductive substrate.

[0015]By using the crystalline phthalocyanine composition which has said specific X diffraction spectrum as charge generating material into a photosensitive layer, if this invention is followed, weak exposure has few attenuating lights and to strong exposure by high sensitivity. Potential attenuation is carried out thoroughly, and as a result of being able to obtain the high sensitivity photo conductor which answers linearly to exposure energy, the electrophotographic photoreceptor with which it is satisfied of all high sensitivity, the high definition, and high resolution can be provided.
[0016]In the X diffraction spectrum over CuKalpha characteristic X ray (wavelength: 1.54A), said crystalline phthalocyanine composition is a bragg angle (2theta**0.2 degree), and this invention is characterized by the ratio of the height of a 16.8-degree peak to 7.0 more degrees being smaller than twice.
[0017]By using the crystalline phthalocyanine composition which has still more specific peak intensity as charge generating material in said specific X diffraction spectrum, if this invention

is followed, As a result of being able to obtain the high sensitivity photo conductor which carries out potential attenuation more nearly thoroughly to strong exposure, the electrophotographic photoreceptor with which it is satisfied of all high sensitivity, the high definition, and high resolution can be provided.

[0018]This invention is titanylphthalocyanine and non-metal phthalocyanines the contained constituent, and said crystalline phthalocyanine composition this crystalline phthalocyanine composition, In the X diffraction spectrum over CuKalpha characteristic X ray (wavelength: 1.54A), it has at least 7.0 degrees, 9.0 degrees, 14.1 degrees, 18.0 degrees, 23.7 degrees, and main peaks in 27.2 degrees by a bragg angle (2theta**0.2 degree).

[0019]It has a crystal form in which the phthalocyanine composition which comprises crystalline titanylphthalocyanine and non-metal phthalocyanines is specific if this invention is followed, As a result of being able to obtain the high sensitivity photo conductor which carries out potential attenuation more nearly thoroughly to strong exposure by using the crystalline phthalocyanine composition containing this constituent as charge generating material, the electrophotographic photoreceptor with which it is satisfied of all high sensitivity, the high definition, and high resolution can be provided.

[0020]This invention is a bragg angle (2theta**0.2 degree) in an X diffraction spectrum [as opposed to CuKalpha characteristic X ray (wavelength: 1.54A) in said crystalline phthalocyanine composition], The chi type non-metal phthalocyanines which have at least 7.6 degrees, 9.0 degrees, 16.8 degrees, 17.3 degrees, and main peaks in 22.3 degrees are contained.

[0021]By using the crystalline phthalocyanine composition containing specific chi type non-metal phthalocyanines as charge generating material, if this invention is followed, As a result of being able to obtain the high sensitivity photo conductor which carries out potential attenuation more nearly thoroughly to strong exposure, the electrophotographic photoreceptor with which it is satisfied of all high sensitivity, the high definition, and high resolution can be provided.

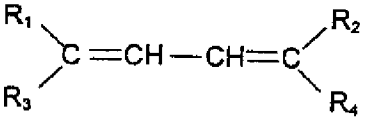
[0022]The aforementioned chi type non-metal phthalocyanines contain this invention ten to 70weight % in the crystalline phthalocyanine composition.

[0023]If this invention is followed, by specifying the content of the aforementioned chi type non-metal phthalocyanines, High resolution and high definition are not obtained without forming a dot correctly at less than 10 weight %, or, when exceeding 70 weight %, a dot sees and flags, black poor concentration falls, high resolution and high sensitivity are not obtained, and the electrophotographic photoreceptor with which it is satisfied of all high sensitivity, the high definition, and high resolution can be provided.

[0024]This invention contains a butadiene compound in which said photosensitive layer is shown with a following general formula (1) as charge transport material.

[0025]

[Chemical formula 3]



(1)

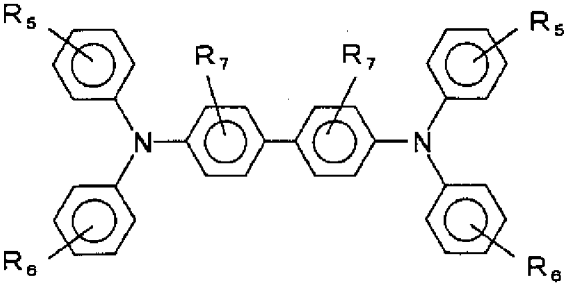
[0026](R_1 - R_4 express among a formula an aralkyl group which may have an aryl group which may have a substituent, or a substituent.)

[0027]Since it will very be high mobility by using a specific butadiene compound as charge transport material if this invention is followed, an electrophotographic photoreceptor with which it is more satisfied of all high sensitivity, the high definition, and high resolution can be provided.

[0028]This invention contains a screw amine compound in which said photosensitive layer is shown with a following general formula (2) as charge transport material.

[0029]

[Chemical formula 4]



(2)

[0030](R_5 and R_6 express among a formula an amino group which may have a hydrogen atom, an alkyl group, an alkoxy group, a halogen atom, an alkoxycarbonyl group, or a substituent respectively.) R_7 expresses an alkyl group or an alkoxy group.

[0031]Since it will very be high mobility by using a specific screw amine compound as charge transport material if this invention is followed, the electrophotographic photoreceptor with which it is more satisfied of all high sensitivity, the high definition, and high resolution can be provided.

[0032]The charge generating layer in which said photosensitive layer contains said crystalline phthalocyanine composition as charge generating material at least, and the charge transport layer containing charge transport material are laminated, and this invention changes.

[0033]If this invention is followed, the electrophotographic photoreceptor of the lamination type with which it is satisfied of all high sensitivity, the high definition, and high resolution can be provided by using the crystalline phthalocyanine composition which has said specific X diffraction spectrum as charge generating material into a charge generating layer.

[0034]This invention is an electrophotography device provided with the semiconductor laser or

light emitting diode which carries said electrophotographic photoreceptor and carries out image exposure to this electrophotographic photoreceptor.

[0035]In the electrophotography device using a semiconductor laser and a light emitting diode (LED) as an exposure light source if this invention is followed, Since it does not expose to the taper with which it was irradiated by these exposure light sources and which spread in the periphery by carrying said electrophotographic photoreceptor, a dot does not spread and better latent image formation can be performed, high definition can be obtained.

[0036]This invention was provided with a means to carry out reversal development of the electrophotographic photoreceptor by which image exposure was carried out by being charged, and to acquire a picture.

[0037]In the electrophotography device using a reversal development process if this invention is followed, By carrying said electrophotographic photoreceptor, surface charge does not decrease in number by any factors other than exposure, Electrophotography devices suitable for the output of digital data with which there is no generating of the black dot to which a toner adheres in a white ground, and it is satisfied of all high sensitivity, the high definition, and high resolution, such as a copying machine, a printer, and a facsimile, can be provided.

[0038]

[Mode for carrying out the invention]Hereafter, this invention is explained in detail.

[0039]Drawing 1 is a sectional view showing the example of composition of the electrophotographic photoreceptor of a lamination type. Drawing 2 is a sectional view showing the example of composition of the electrophotographic photoreceptor of a monolayer type. In the lamination type photo conductor of drawing 1, the photosensitive layer 4 is formed on the conductive substrate 2, and the photosensitive layer 4 comprises two-layer [of the charge generating layer 5 containing the charge generating material 8 and the binder resin 7, and the charge transport layer 6 containing the charge transport material 9 and the binder resin 18]. In the monolayer type photo conductor of drawing 2, the photosensitive layer 14 is formed on the conductive substrate 2, and the charge transport material 9, the charge generating material 8, and the binder resin 19 contain in the photosensitive layer 14.

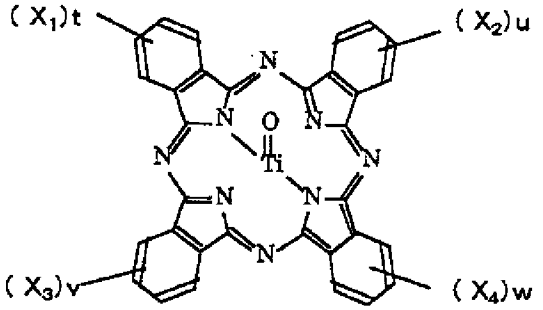
[0040]As composition of the electrophotographic photoreceptor by this invention, which photo conductor of a lamination type like drawing 1 and a monolayer type like drawing 2 may be sufficient. The electrophotographic photoreceptor by this invention uses a crystalline phthalocyanine composition specific to the photosensitive layer 14 in a monolayer type for the charge generating layer 5 as the charge generating material 8 in a lamination type.

[0041]Specifically, the specific crystalline phthalocyanine composition used as the charge generating material 8 has phthalocyanine compounds, such as non-metal phthalocyanines shown by the metal phthalocyanines shown with a following general formula (3), and a general formula (4). A specific crystalline phthalocyanine composition may be a constituent which may

have only either metal phthalocyanines or the non-metal phthalocyanines, and mixed these, as long as the characteristic in the X diffraction spectrum shown below is shown.

[0042]

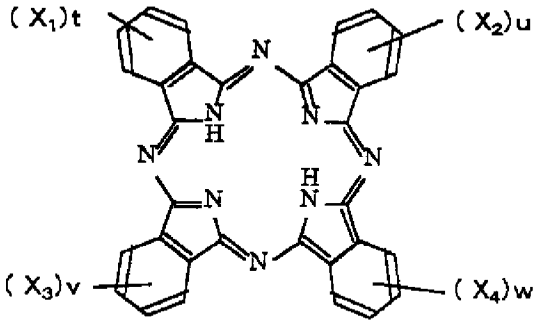
[Chemical formula 5]



(3)

[0043]

[Chemical formula 6]



(4)

[0044](X_1 - X_4 express a hydrogen atom, a halogen atom, an alkyl group, or an alkoxy group respectively among a formula (3) and (4), and t, u, v, and w express the integer of 0-4.)

[0045]In the X diffraction spectrum over CuKalpha characteristic X ray (wavelength: 1.54A), said specific crystalline phthalocyanine composition is a bragg angle (2theta**0.2 degree), It is crystalline phthalocyanine composition ** which shows a peak to at least 7.0 degrees, 7.6 degrees, 9.0 degrees, 13.6 degrees, 16.8 degrees, and 27.2 degrees.

[0046]In the X diffraction spectrum over CuKalpha characteristic X ray (wavelength: 1.54A), said crystalline phthalocyanine composition ** is a bragg angle (2theta**0.2 degree), It is preferred that the ratio of the height of a 16.8-degree peak to 7.0 more degrees is crystalline phthalocyanine composition ** smaller than twice.

[0047]Said crystalline phthalocyanine composition ** or **, Crystalline phthalocyanine composition ** which comprises titanylphthalocyanine and non-metal phthalocyanines is contained, In the X diffraction spectrum over CuKalpha characteristic X ray (wavelength: 1.54A), this crystalline phthalocyanine composition ** is a bragg angle (2theta**0.2 degree), It is preferred to have at least 7.0 degrees, 9.0 degrees, 14.1 degrees, 18.0 degrees, 23.7 degrees, and peaks main at 27.2 degrees.

[0048]Said crystalline phthalocyanine composition ** or **, In the X diffraction spectrum over CuKalpha characteristic X ray (wavelength: 1.54A), by a bragg angle (2theta**0.2 degree). It is more preferred to contain chi type non-metal-phthalocyanines ** which has at least 7.6 degrees, 9.0 degrees, 16.8 degrees, 17.3 degrees, and main peaks in 22.3 degrees.
[0049]As for especially said crystalline phthalocyanine composition ** or **, it is most preferred to contain both phthalocyanine composition ** and chi type non-metal-phthalocyanines **.
[0050]As for the aforementioned chi type non-metal phthalocyanines, it is preferred to contain ten to 70weight % in a crystalline phthalocyanine composition. it is because high resolution and high definition are not obtained without forming a dot correctly, a dot will see and flag, black poor concentration will fall and high resolution and high sensitivity will not be obtained at less than 10 weight %, if it exceeds 70 weight %.
[0051]The electrophotographic photoreceptor by this invention is constituted by [above] containing in the photosensitive layer 4 or 14 by using specific phthalocyanine as the charge generating material 8. As mentioned above, which photo conductor of a monolayer type as shown in a lamination type as shown in drawing 1, and drawing 2 may be sufficient as the electrophotographic photoreceptor by this invention.
[0052]Also in which photo conductor of a lamination type and a monolayer type as the conductive substrate 2, For example, aluminum, an aluminum alloy, stainless steel, iron, gold, Metallic materials, such as silver, copper, zinc, nickel, and titanium, and aluminum, The plastic containing the plastic substrate, polyester film and paper, and the conductive particle which vapor-deposited gold, silver, copper, nickel, indium oxide, tin oxide, etc., paper, the plastic containing a conductive polymer, etc. can be used. As those form, the shape of a drum, a sheet shaped, the shape of a seamless belt, etc. are mentioned.
[0053]On the conductive substrate 2, in the case of a lamination type photo conductor as shown in drawing 1, the photosensitive layer 4 is formed, and, in the case of a monolayer type photo conductor as shown in drawing 2, the photosensitive layer 14 is formed.
[0054]On the conductive substrate 2, the charge generating layer 5 containing said specific crystalline phthalocyanine composition and the charge transport layer 6 are laminated one by one, and the photosensitive layer 4 of a lamination type electrophotographic photoreceptor is constituted.
[0055]There is a method by applying coating liquid for charge generating layers produced by grinding said specific phthalocyanine compound and distributing as a formation method of the charge generating layer 5 on the conductive substrate 2. With a ball mill, a Sand grinder, a paint shaker, an ultrasonic dispersion machine, etc., it grinds, and an organic solvent is added to particles of said specific phthalocyanine compound, and, specifically, coating liquid for charge generating layers is prepared dispersedly. In forming a sheet-shaped photo conductor, this coating liquid for charge generating layers with a baker applicator, bar coater, casting, a

spin coat, etc. In forming a photo conductor of drum shape, by spray method, vertical Ling's method, a dip coating method, etc., it applies on the conductive substrate 2 and forms the charge generating layer 5.

[0056]Drawing 3 is a block diagram showing an example of the dip coating equipment used in a dip coating method. The cylindrical conductive base substance 2 is immersed into the coating liquid 12 filled in the coating layer 13. The base substance 2 descends with the lifting device 10 provided with the motor 11, and is immersed into the coating liquid 12. When the lifting device 10 controls the rotation of the motor 11, only the desired depth can immerse the base substance 2 in the coating tank 13. After the base substance 2 is immersed enough, it can be pulled up with the lifting device 10 at constant speed or the speed which changes one by one. The coating liquid 12 overflowed from the coating tank 13 at the time of base substance immersion is collected by the collection tank 14. After the collected coating liquid is stirred with the agitating equipment 15, it is returned to the coating tank 13 with the pump 16.

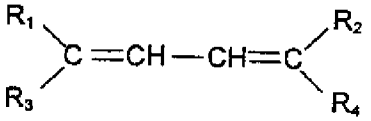
[0057]Since a binding property is increased, in the coating liquid for charge generating layers as the binder resin 7, For example, polyester resin, polyvinyl acetate, polyacrylic ester, Polycarbonate, polyarylate, a polyvinyl aceto acetal, Polyvinyl propional, a polyvinyl butyral, phenoxy resin, an epoxy resin, urethane resin, melamine resin, silicone resin, an acrylic resin, cellulose ester, cellulose ether, polyvinyl chloride acetate copolymer resin, etc. may be added. Various additive agents, such as a leveling agent for improving spreading nature, an antioxidant, and a sensitizer, may be included in the charge generating layer 5 if needed.

[0058]As for the thickness of the charge generating layer 5, 0.05-5 micrometers is preferred, and 0.1-1 micrometer is especially preferred for it.

[0059]The charge transport layer 6 mainly comprises the charge transport material 9 and the binder resin 18. As the charge transport material 9, electronic suction nature substances, such as a 2,4,7-trinitro fluorenone, tetracyano quinodimethane, and diphenoquinone, Carbazole, Indore, imidazole, oxazol, a pyrazole, Heterocyclic compounds, such as oxadiazole, pyrazoline, and thiadiazole, Electron-donative substances, such as a polymer which has a basis which consists of an aniline derivative, a hydrazone compound, an aromatic amine derivative, a styryl compound, a butadiene compound, a screw amine compound, enamine compounds, and these compounds in a main chain or a side chain, are mentioned. Since especially the screw amine compound shown with a specific styryl system compound, the butadiene compound shown with a following general formula (1), and a following general formula (2) is very high mobility, it is suitable for high-sensitivity-izing and high-resolution-izing. Such charge transport material 9 may be independent, or plurality may be mixed and it may be used.

[0060]

[Chemical formula 7]

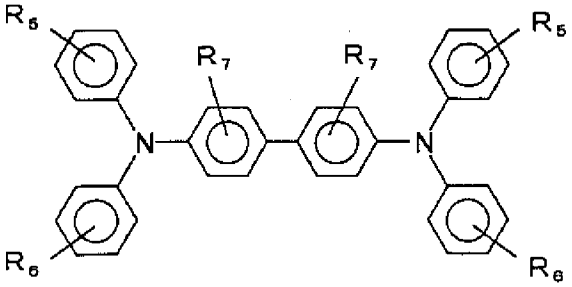


(1)

[0061](R_1 - R_4 express among a formula the aralkyl group which may have an aryl group which may have a substituent, or a substituent.)

[0062]

[Chemical formula 8]



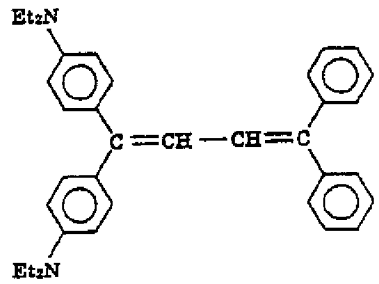
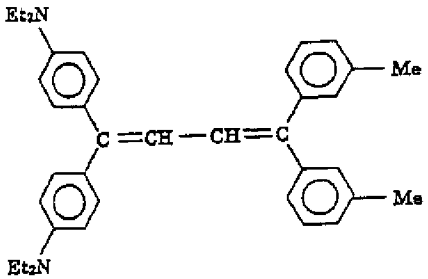
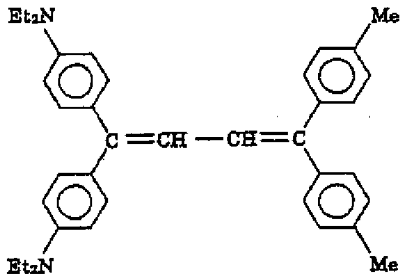
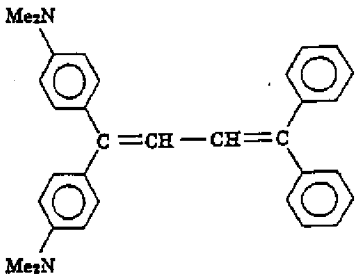
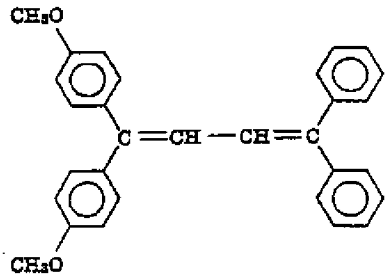
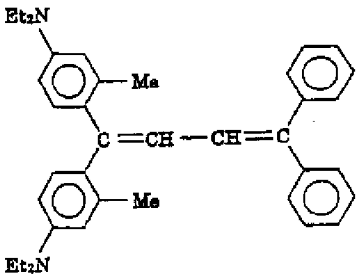
(2)

[0063](R_5 and R_6 express among a formula the amino group which may have a hydrogen atom, an alkyl group, an alkoxy group, a halogen atom, an alkoxycarbonyl group, or a substituent respectively.) R_7 expresses an alkyl group or an alkoxy group.

The example of the butadiene compound shown by a general formula (1) is shown in Table 1 and 2.

[0064]

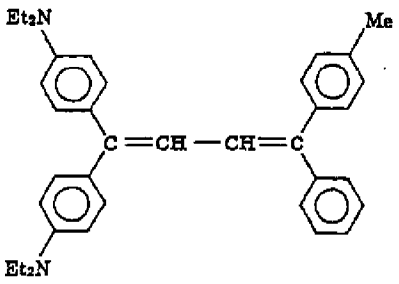
[Table 1]

化合物［1－1］ 	化合物［1－2］ 
化合物［1－3］ 	化合物［1－4］ 
化合物［1－5］ 	化合物［1－6］ 

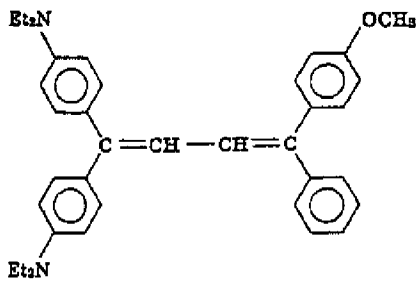
[0065]

[Table 2]

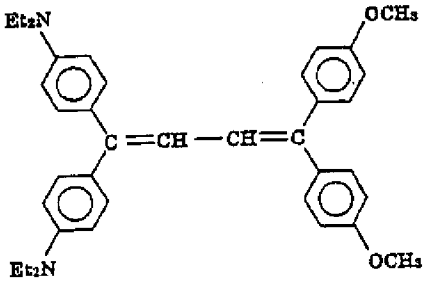
化合物［１－７］



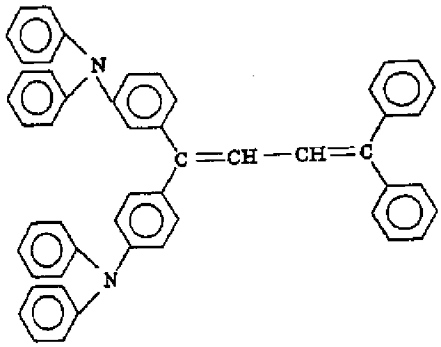
化合物［１－８］



化合物［１－９］



化合物［１－10］

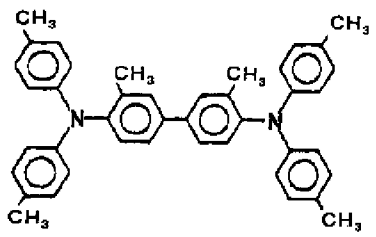


[0066]The example of the screw amine compound shown by a general formula (2) is shown in Table 3.

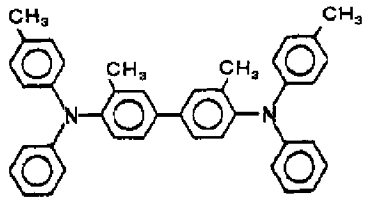
[0067]

[Table 3]

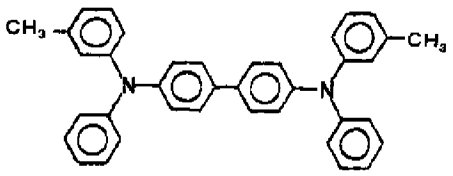
化合物［２－１］



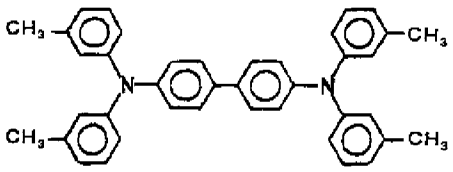
化合物［２－２］



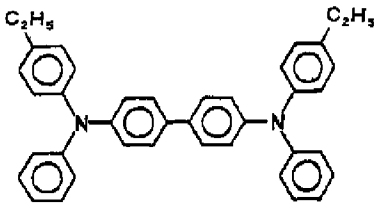
化合物［２－３］



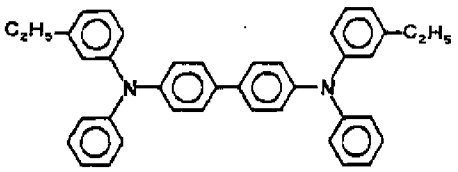
化合物［２－４］



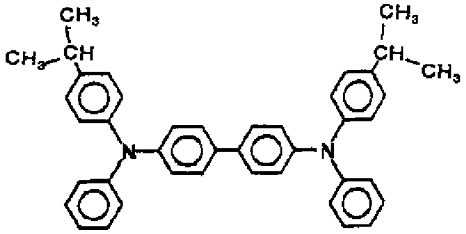
化合物［２－５］



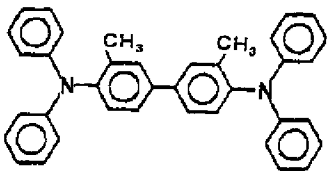
化合物［２－６］



化合物［２－７］



化合物［２－８］



[0068]As the binder resin 18, for example Polycarbonate, polymethylmethacrylate, Vinyl polymerization objects, such as polystyrene and polyvinyl chloride, the copolymer of those, Polyester, polyester carbonate, polyarylate, polysulfone, polyimide, phenoxy resin, an epoxy resin, silicone resin, etc. are mentioned, and these partial bridge construction hardened materials can also be used.

[0069]The charge transport layer 6 is formed in the form which the above-mentioned charge transport material 9 bound to the binder resin 18. To binder resin 100 weight section, the rate of the binder resin 18 and the charge transport material 9 has 30 to 200 preferred weight section, and is more preferably used in the range of 40 to 150 weight section. The charge

transport layer 6 may be made to contain additive agents, such as a well-known plasticizer, an antioxidant, an ultraviolet ray absorbent, and a leveling agent, in order to raise membrane formation nature, flexibility, spreading nature, etc. The charge transport layer 6 is formed using the above-mentioned charge transport material 9, the binder resin 18, etc. by applying the coating liquid for charge generating layers, and the coating liquid for charge transport layers prepared similarly on the charge generating layer 5 using the same equipment as the charge generating layer 5.

[0070]As for the thickness of the charge transport layer 6, 5-50 micrometers is preferred, and it is 10-45 micrometers more preferably.

[0071]The photosensitive layer 14 of a monolayer type electrophotographic photoreceptor is contained and constituted with the charge transport material 9 by using said specific phthalocyanine as the charge generating material 8 on the conductive substrate 2. There is a method of using for the coating liquid for charge transport layers of a monolayer type photo conductor and the liquid of the same compounding ratio the coating liquid for photosensitive layers in which said specific crystalline phthalocyanine composition was distributed as the charge generating material 8 as a formation method of the photosensitive layer 14. In that case, the particle diameter of said specific crystalline phthalocyanine composition needs a small enough thing, and is 1 micrometer or less preferably. If too little [the quantity of the charge generating material 8 distributed in the photosensitive layer 14], it has the evil of the shortage of sensitivity, inducing an electrostatic property fall and sensitivity lowering, if excessive, and its 0.5 to 50 weight % is preferred, and it is more preferably used at 1 to 20 weight %. In order to improve membrane formation nature, flexibility, a mechanical strength, etc. also to the photosensitive layer 14 of a monolayer type photo conductor, Leveling agents, such as silicone oil for improving the distributed adjuvant for the additive agent for controlling a publicly known plasticizer and rest potential conventionally and the improvement in dispersion stability and spreading nature and fluorine system oil, a surface-active agent, and other additive agents may be added.

[0072]5-40 micrometers of thickness of the photosensitive layer 14 are preferably used at 15-30 micrometers. Between the conductive substrate 2 and the photosensitive layer 4 or 14, the under-coating layer which is an intermediate layer may be provided. As an intermediate layer, for example Inorganic layers, such as an aluminum anode oxide layer, an aluminum oxide, and aluminium hydroxide, Or organic layers, such as polyvinyl alcohol, casein, a polyvinyl pyrrolidone, polyacrylic acid, cellulose, gelatin, starch, polyurethane, polyimide, and polyamide, can be used. An under-coating layer applies the coating liquid for under-coating layers containing such materials on said conductive substrate 2, and is formed.

[0073]Polyamide resin is [among these] more preferred. Neither the dissolution nor swelling takes place to the solvent used when the Reason forms a photo conductor layer on an under-

coating layer as the characteristic of binder resin, It is because conditions, like excelling in an adhesive property with a conductive substrate, having flexibility, and the cost price can be held down low are needed. Alcohol soluble nylon resin can be especially used preferably among polyamide resin. . For example, carried out copolymerization of 6-nylon, 66-nylon, 610-nylon, 11-nylon, the 12-nylon, etc. There are a type etc. which denatured nylon chemically like what is called copolyamide, and N-alkoxy methyl denaturation nylon and N-alkoxy ethyl denaturation nylon.

[0074]Metal or metallic oxides, such as aluminum, copper, tin, zinc, and titanium, etc. may contain conductive or semi-conductive particles in these intermediate layers.

[0075]A common organic solvent can be used as an organic solvent used for the coating liquid for under-coating layers. In using desirable alcohol soluble nylon resin as binder resin of an under-coating layer especially, The lower alcohol group of the carbon numbers 1-4, and organic solvents other than this lower alcohol, For example, it is preferred that it is the organic solvent of an independent system or mixed stock chosen from the group which comprises dichloromethane, chloroform, 1,2-dichloroethane, 1,2-dichloropropane, toluene, a tetrahydrofuran, 1,3-dioxolane, etc. By mixing organic solvents other than said lower alcohol, the dispersibility of titanium oxide is improved and protraction of the preservation stability of coating liquid and the reproduction of coating liquid also of an alcohols solvent independent twist are attained. Since the photosensitive layer which prevents the application defect and nonuniformity of an under-coating layer, and is formed on it can apply uniformly when carrying out dip coating of the conductive substrate and forming an under-coating layer into the coating liquid for under-coating layers, the electrophotographic photoreceptor which has the dramatically outstanding picture characteristic without a film defect is producible.

[0076]As for an intermediate layer's thickness, 0.01-20 micrometers is preferred, and the range of it is 0.05-10 micrometers more preferably. If the thickness of an under-coating layer is thinner than 0.01 micrometer, will stop functioning as an under-coating layer substantially, will cover the defect of the conductive substrate 2, and uniform surface nature will not be obtained, but it becomes impossible to prevent pouring of the electric charge from the conductive substrate 2, and the fall of electrostatic property arises. It becomes difficult, when carrying out dip coating of the under-coating layer, and manufacturing a photo conductor to make it thicker than 20 micrometers, and the sensitivity of a photo conductor falls.

[0077]Said binder resin, a metallic oxide, etc. are distributed by the above-mentioned organic solvent, and the coating liquid for under-coating layers is prepared. Dispersion methods of the coating liquid for under-coating layers include the method by ball mill, a sand mill, attritor, a vibration mill, an ultrasonic dispersion machine, etc. As a coating method of the coating liquid for under-coating layers, general methods, such as the above-mentioned dip coating method, are applicable.

[0078]Also in which photo conductor of a lamination type and a monolayer type, if required on the photosensitive layer 4 or 14, in order to protect a photosensitive layer surface, a protective layer may be provided. Thermoplastics and light, or thermosetting resin can be used for a surface protection layer. Inorganic materials, such as an ultraviolet ray absorbent, an antioxidant, and a metallic oxide, an organic metallic compound, an electron accepting substance, etc. may be made to contain in a protective layer. To a protective layer, like a photosensitive layer, if needed A dibasic acid ester, Plasticizers, such as fatty acid ester, phosphoric ester, phthalic ester, and a chlorinated paraffin, are mixed, processability and plasticity may be given and mechanical properties may be improved, and it does not matter even if it mixes additive agents, such as a leveling agent.

[0079]Drawing 4 is a block diagram showing the laser beam printer 30 which carries the electrophotographic photoreceptor by this invention. The laser beam printer 30 which is an electrophotography device is constituted including the photo conductor 100, the semiconductor laser 31, the corona-electrical-charging machine 36, the development counter 37, the transfer electrification machine 41, the separator electrical machinery 42, the fixing assembly 44, the delivery tray 45, and the cleaner 46. In the laser beam printer 30, the surface of the photo conductor 100 is uniformly electrified in negative polarity with the corona-electrical-charging machine 36, Based on picture information, carry out an optical exposure with the semiconductor laser 31, and perform image exposure, and rotate the photo conductor 100, an exposure region is made to arrive at a developer and the developing area which counters, and the reversal development system which the toner by which minus electrification was carried out is made to adhere to an exposure region, and is developed is adopted.

[0080]In the electrophotography device using such a semiconductor laser and a light emitting diode (LED) as an exposure light source, Since it does not expose to the taper with which it was irradiated by these exposure light sources and which spread in the periphery by carrying the electrophotographic photoreceptor containing said specific crystalline phthalocyanine composition, a dot does not spread and better latent image formation can be performed, high definition can be obtained.

[0081]Since a toner image is formed in the portion into which the surface charge of the exposure part decreased in number when forming a picture using such a reversal development process, if surface charge decreases in number by factors other than exposure, fogging of pictures, such as a black dot in which a toner adheres to a white ground, will occur, and remarkable image quality deterioration will be produced. This serves as a remarkable image defect -- a sunspot occurs on a white ground -- by originating in the defect of a conductive substrate or a photosensitive layer, and causing the fall of the electrostatic property in a minute field. However, in the electrophotographic photoreceptor which forms an under-coating layer as mentioned above, the application membrane of a very uniform photosensitive layer without

an application defect or nonuniformity can be formed. Therefore, if said electrophotographic photoreceptor is carried, surface charge will not decrease in number by any factors other than exposure, Electrophotography devices suitable for the output of digital data with which there is no generating of the black dot to which a toner adheres in a white ground, and it is satisfied of all high sensitivity, the high definition, and high resolution, such as a copying machine, a printer, and a facsimile, can be provided.

[0082]

[Working example]Although an embodiment is given to below and the electrophotographic photoreceptor by this invention and the electrophotography device using it are explained concretely, unless the meaning is exceeded, it is not limited to the following embodiments.

[0083](Example 1 of manufacture) 40 g of o-phtalo dinitrile, and the titanium tetrachloride 18g, Heat and stir 500 ml of alpha-chloronaphthalenes for 3 hours, they were made to react at 200-250 ** under a nitrogen atmosphere, and it filtered after radiational cooling to 100-130 ** at the time of heat, it washed by 200 ml of alpha-chloronaphthalenes heated at 100 **, and the dichloro titanium phthalocyanine rough product was obtained. In 200 ml of alpha-chloronaphthalenes, subsequently, 200 ml of methanol performed ****** for this rough product in 500 ml of methanol further after washing at the room temperature for 1 hour. It dried and the titanylphthalocyanine crystal was obtained, after repeating ****** after filtration until pH was set to 6-7 in 500 ml of water in the obtained rough product.

[0084]Add non-metal phthalocyanines to the obtained crystal, and it mixes to 1,3-dioxolane, After it carried out milling processing with a glass bead 2 mm in diameter with paint conditioner equipment (made by a red level company) and methanol washed, it dried and the specific crystalline phthalocyanine composition in this invention was obtained.

[0085]About the obtained crystalline phthalocyanine composition, the X diffraction spectrum was measured on condition of the following. Also about the crystalline phthalocyanine used in Embodiment 5 mentioned later, it measured on the same conditions.

alpha= 1.54A of X line source CuK(s) voltage 30 - 40-kV current 100-mA start angle 5.0-degree stop angle 30.0-degree travel 0.01 - 0.02-degree measuring time 2.0-0.5 degree /, min.

Measuring method theta/2theta Scanning procedure [0086]In the X diffraction spectrum over CuKalpha characteristic X ray (wavelength: 1.54A), at least the obtained crystalline phthalocyanine composition by a bragg angle (2theta**0.2 degree) 7.0 degrees, It was a crystalline phthalocyanine composition in which 9.0 degrees, 14.1 degrees, 18.0 degrees, 23.7 degrees, and peaks main at 27.2 degrees are shown and which comprises titanylphthalocyanine and non-metal phthalocyanines.

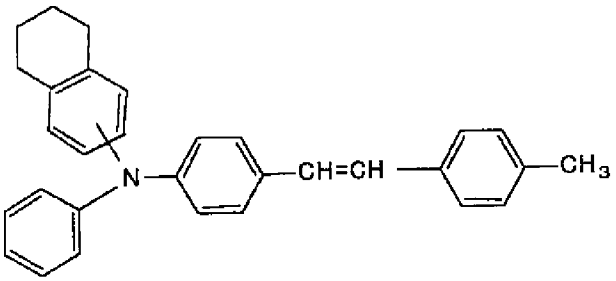
[0087](Embodiment 1) Crystalline phthalocyanine composition 0.9 weight section and chi type non-metal-phthalocyanines (Dainippon Ink Fastogen Blue 8120BS) 0.9 weight section which

were produced in the example 1 of manufacture, and butyral resin (BL-1 by Sekisui Chemical Co., Ltd.) 1.2 weight section, It mixed to 1,3-dioxolane 97 weight section, distributed processing was carried out with the paint shaker, and the coating liquid for charge generating layers was prepared. The aforementioned chi type non-metal phthalocyanines show 7.6 degrees, 9.0 degrees, 16.8 degrees, 17.3 degrees, and main peaks at least to 22.3 degrees according to a bragg angle (2theta**0.2 degree) in the X diffraction spectrum over CuKalpha characteristic X ray (wavelength: 1.54A). The place which carried out X diffraction spectrum measurement of the crystalline phthalocyanine composition of the prepared coating liquid for charge generating layers, The X diffraction spectrum which has a peak in 7.0 degrees, 7.6 degrees, 9.0 degrees, 13.6 degrees, 16.8 degrees, and 27.2 degrees by a bragg angle (2theta**0.2 degree) at least in the X diffraction spectrum over CuKalpha characteristic X ray (wavelength: 1.54A) was shown. It filled to the coating tank 13 of dip coating equipment as showed drawing 3 this coating liquid for charge generating layers, the drum-like base material made from aluminum (30 mm in diameter and 326.3 mm in overall length) was immersed, pulled up and air-dried as a conductive substrate, and the charge generating layer of 0.5 micrometer of thickness was formed.

[0088]Styryl compound 10 weight section shown with the following structural formula (5) and polycarbonate resin (PCZ400 by Mitsubishi Gas Chemical Co., Inc.) 16 weight section which has a repeating unit shown with the following structural formula (6) were mixed, and the coating liquid for charge transport layers of 21 weight % of solid content was prepared by using THF as a solvent. The prepared coating liquid for charge transport layers was applied on the charge generating layer like the coating liquid for charge generating layers, and was dried at 110 ** for 1 hour, and the charge transport layer of 22 micrometers of thickness was formed. The lamination type electrophotographic photoreceptor was produced as mentioned above.

[0089]

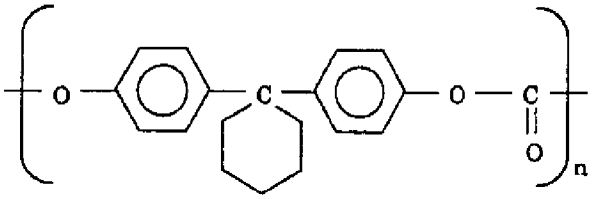
[Chemical formula 9]



(5)

[0090]

[Chemical formula 10]



(6)

[0091](Embodiment 2) 1.8 weight sections and butyral resin (BL-1 by Sekisui Chemical Co., Ltd.) 1.2 weight section were mixed to 1,3-dioxolane 97 weight section, the distributed processing of the crystalline phthalocyanine composition produced in the example 1 of manufacture was carried out with the paint shaker, and the coating liquid A for charge generating layers was obtained.

[0092]In the X diffraction spectrum over CuKalpha characteristic X ray (wavelength: 1.54A), by a bragg angle (2theta**0.2 degree), at least 7.6 degrees, chi type non-metal-phthalocyanines (Dainippon Ink Fastogen Blue 8120BS) 1.8 weight section which has 9.0 degrees, 16.8 degrees, 17.3 degrees, and main peaks in 22.3 degrees, It mixed to 1,3-dioxolane 97 weight section, the distributed processing of the butyral resin (BL-1 by Sekisui Chemical Co., Ltd.) 1.2 weight section was carried out with the paint shaker, and the coating liquid B for charge generating layers was obtained.

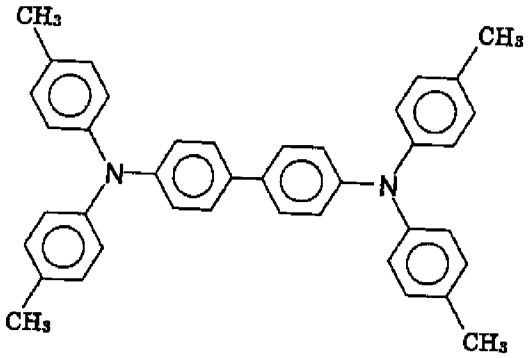
[0093]After carrying out dip coating of the coating liquid which mixed these two coating liquid A and B for charge generating layers into the ratio of A:B=60:40 by the weight ratio on the conductive substrate (30 mm in diameter, and 326.3 mm in overall length) of the shape of a drum made from aluminum, it air-dried and the charge generating layer of 0.5 micrometer of thickness was formed.

[0094]Drawing 5 is a figure showing the X diffraction spectrum of the crystalline phthalocyanine composition obtained in Embodiment 2 of this invention. The place which carried out X diffraction spectrum measurement of the crystalline phthalocyanine composition of the coating liquid (A:B=60:40) which mixed the coating liquid A and B for charge generating layers, The X diffraction spectrum which has a peak in 7.0 degrees, 7.6 degrees, 9.0 degrees, 13.6 degrees, 16.8 degrees, and 27.2 degrees by a bragg angle (2theta**0.2 degree) at least in the X diffraction spectrum over CuKalpha characteristic X ray (wavelength: 1.54A) was shown.

[0095]Subsequently, screw amine compound 10 weight section shown with the following structural formula (7), Polycarbonate resin (Mitsubishi Gas Chemical Co., Inc. make-CZ400) 16 weight section which has a repeating unit shown with said structural formula (6) was mixed, and the coating liquid for charge transport layers of 21 weight % of solid content was prepared by using THF as a solvent. The coating liquid for charge transport layers was applied on the charge generating layer formed previously, was dried at 110 ** for 1 hour, and the charge transport layer of 22 micrometers of thickness was formed. The lamination type photo conductor was produced as mentioned above.

[0096]

[Chemical formula 11]



(7)

[0097](Embodiment 3) The photo conductor was produced like Embodiment 2 except having used the coating liquid A and B for charge generating layers prepared in Embodiment 2 as coating liquid mixed into the ratio of A:B=90:10 by the weight ratio.

[0098](Embodiment 4) The photo conductor was produced like Embodiment 2 except having used the coating liquid A and B for charge generating layers prepared in Embodiment 2 as coating liquid mixed into the ratio of A:B=30:70 by the weight ratio.

[0099](Embodiment 5) After mixing the coating liquid A and B for charge generating layers used in Embodiment 2 into the ratio of A:B=60:40 by a weight ratio, the coating liquid for charge generating layers containing the crystalline phthalocyanine composition further produced by carrying out covariance with the paint shaker was prepared. Dip coating of the prepared coating liquid for charge generating layers was carried out on the conductive substrate like Embodiment 2, and the charge generating layer of 0.5 micrometer of thickness was formed by natural seasoning. The charge transport layer was formed still like Embodiment 2, and the photo conductor was produced.

[0100]Drawing 6 is a figure showing the X diffraction spectrum of the crystalline phthalocyanine composition obtained in Embodiment 5 of this invention. The place which carried out X diffraction spectrum measurement of the crystalline phthalocyanine composition of the coating liquid produced by carrying out the covariance of the coating liquid (A:B=60:40) which mixed the coating liquid A and B for charge generating layers, In the X diffraction spectrum over CuKalpha characteristic X ray (wavelength: 1.54A), by a bragg angle (2theta**0.2 degree), at least 7.0 degrees, It has 7.6 degrees, 9.0 degrees, 13.6 degrees, 16.8 degrees, and peaks main at 27.2 degrees, and the X diffraction spectrum whose height of the 16.8-degree peak over 7.0 degrees is smaller than twice was shown.

[0101](Comparative example 1) The photo conductor was produced like Embodiment 2 except having formed the charge generating layer using the coating liquid A for charge generating layers prepared in Embodiment 2.

[0102](Comparative example 2) The photo conductor was produced like Embodiment 2 except

having formed the charge generating layer using the coating liquid B for charge generating layers prepared in Embodiment 2.

[0103](Evaluation 1) It carried in the experimental aircraft converted so that the dot of 1200dpi could output the copying machine (AR-N200 by a sharp company) which adopted the commercial reversal development process for the electrophotographic photoreceptor produced by Embodiments 1-5 and the comparative examples 1 and 2, and resolution was examined. The data (data made scan laser completely and off 1 dot) which made white 1 dot write to black solid with a personal computer is produced, The outputted image which transmitted this data to said experimental aircraft via the printer interface, and was printed out under the ordinary temperature normal relative humidity of 25 **/60%RH (the "N/N environment" is called hereafter) was observed. Resolution (N/N resolution) was evaluated about the picture outputted under N/N environment. The black poor picture was outputted for said experimental aircraft under the low-humidity/temperature environment of 5 **/20%RH ("L/L environment" is called hereafter). Sensitivity (L/L sensitivity) was evaluated about the black poor picture outputted under L/L environment. The white poor picture was outputted under the high-humidity/temperature environment of 35 **/85%RH ("H/H environment" is called hereafter). Image quality (H/H picture) was evaluated about the white poor picture outputted under H/H environment. The above evaluation result is shown in Table 4.

[0104]

[Table 4]

	画像評価		
	N／N 解像度	L／L 感度	H／H 画像
実施例 1	○	○	△
実施例 2	○	○	△
実施例 3	○	○	△
実施例 4	○	○	○
実施例 5	◎	◎	◎
比較例 1	×	○	×
比較例 2	××	×	○

N／N 解像度 ◎：特に良好 ○：問題なし ×：解像度低下 ××：解像度、感度低下

L／L 感度 ◎：特に良好 ○：問題なし ×：著しく画像濃度低下

H／H 画像 ◎：特に良好 ○：問題なし △：若干黒ポチ発生 ×：著しく黒ポチ発生

[0105]From Table 4, a flake of 1 dot has checked N/N resolution clearly on black solid also about which embodiment. This showed that the photo conductor by this invention could output sufficient high resolution images. A good picture in which L/L sensitivity does not have an image density fall was acquired also about which embodiment. Although some black dot generated a H/H picture in Embodiments 1-3, neither was real on a big problem on actual use, and it turned out that sufficient high resolution images can be outputted. Although the comparative example 1 transmitted data to which a dot is made to output, as for an outputted picture, it turned out that a black poor next door and a dot are not formed correctly. a dot of an

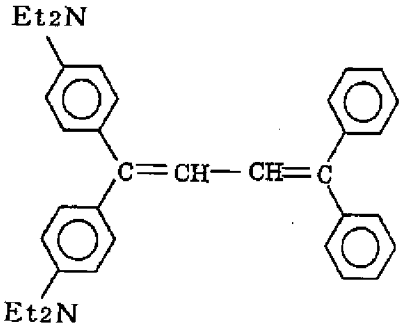
outputted picture saw the comparative example 2, it became bored, and black poor concentration was falling.

[0106]From the above result, by forming a charge generating layer containing charge generating material which has a specific crystal form into a photosensitive layer provided on a conductive substrate, a black dot under H/H environment can be controlled maintaining resolution, and sensitivity lowering under L/L environment can be prevented. That is, an electrophotographic photoreceptor with which it is satisfied of all of high sensitivity, high definition, and high resolution is producible.

[0107](Embodiment 6) The electrophotographic photoreceptor was produced like Embodiment 2 except having used the butadiene compound shown with the following structural formula (8) instead of the screw amine compound used in Embodiment 2.

[0108]

[Chemical formula 12]



(8)

[0109](Embodiment 7) The electrophotographic photoreceptor was produced like Embodiment 5 except having used the butadiene compound shown with said structural formula (8) instead of the screw amine compound used in Embodiment 5.

[0110](Comparative example 3) The electrophotographic photoreceptor was produced like the comparative example 1 except having used the butadiene compound shown with said structural formula (8) instead of the screw amine compound used by the comparative example 1.

[0111](Comparative example 4) The electrophotographic photoreceptor was produced like the comparative example 1 except having used the butadiene compound shown with said structural formula (8) instead of the screw amine compound used by the comparative example 2.

[0112](Evaluation 2) The attenuating light characteristic of the electrophotographic photoreceptor produced by Embodiments 6 and 7 and the comparative examples 3 and 4 was measured. The surface of an electrophotographic photoreceptor using a drum sensitivity test machine (made by Gentec) with a scorotron charger. -600**20V was electrified, and the light intensity of the semiconductor laser beam (wavelength of 780 nm) which is an exposure light source was adjusted with the ND filter, it glared on the surface of the photo conductor, and the

surface potential which can set each light intensity was measured.

[0113]Drawing 7 and drawing 8 are the figures showing the attenuating light characteristic in the electrophotographic photoreceptor of the embodiment of this invention, and a comparative example.

[0114]The attenuating light characteristic of the photo conductor of Embodiment 6 had the small attenuating light to weak exposure, as shown in the photo conductor A of drawing 7, and it turned out that the attenuating light is fully carried out to strong exposure. As shown in the photo conductor B of drawing 7, to weak exposure, the attenuating light characteristic of the photo conductor of Embodiment 7 has a small attenuating light, and it is carrying out the attenuating light thoroughly to strong exposure.

It turned out that sensitivity is improving further from Embodiment 6.

The attenuating light characteristic of the photo conductor of the comparative example 3 was understood that an attenuating light is large also by weak exposure, as shown in the photo conductor C of drawing 7. When the picture which outputted the data which made white 1 dot write to black solid like the evaluation 1 was examined about the photo conductor of the comparative example 3, in spite of having sent the data to which a dot is made to output, the outputted picture became black solid and it became clear that the dot was not formed correctly.

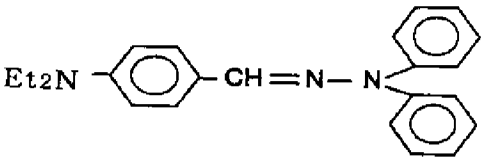
The attenuating light characteristic photo conductor of the comparative example 4 was understood that the strong exposure of an attenuating light is also insufficient as shown in the photo conductor D of drawing 7, and rest potential is large. When the picture which outputted the data which made white 1 dot write to black solid like the evaluation 1 was examined about the photo conductor of the comparative example 4, the dot of the outputted picture could be distinguished, but the concentration of the black solid portion was low.

[0115](Embodiment 8) After mixing crystalline phthalocyanine composition 10 weight section and chi type non-metal-phthalocyanines (Dainippon Ink Fastgen Blue 8120BS) 5 weight section which were produced in the example 1 of manufacture to 1,3-dioxolane 185 weight section and carrying out distributed processing with a paint shaker, Butadiene compound 100 weight section shown with said structural formula (8) and polycarbonate resin (PCZ400 by Mitsubishi Gas Chemical Co., Inc.) 160 weight section were mixed, and the coating liquid of 21 weight % of solid content was prepared by using THF as a solvent. This coating liquid was filled to the coating tank, the drum-like base material made from aluminum (30 mm in diameter and 326.3 mm in overall length) was immersed and pulled up as a conductive substrate, it dried at 110 ** for 1 hour, the photosensitive layer 14 of 20 micrometers of thickness was formed, and the monolayer type photo conductor was produced.

[0116](Embodiment 9) The electrophotographic photoreceptor was produced like Embodiment 5 except having used the hydrazone compound shown with the following structural formula (9) instead of the screw amine compound used in Embodiment 5.

[0117]

[Chemical formula 13]



(9)

[0118](Comparative example 5) The electrophotographic photoreceptor was produced like the comparative example 1 except having used the hydrazone compound shown with said structural formula (9) instead of the screw amine compound used by the comparative example 1.

[0119](Comparative example 6) An electrophotographic photoreceptor was produced like the comparative example 2 except having used a hydrazone compound shown with said structural formula (9) instead of a screw amine compound used by the comparative example 2.

[0120](Evaluation 3) It carried in an experimental aircraft which was converted so that a dot of 1200dpi could output a copying machine (AR-N200 by a sharp company) which adopted a commercial reversal development process for an electrophotographic photoreceptor produced in Embodiment 8, and was further converted into a right electrification process, and resolution was examined. Data (data made scan laser completely and off 1 dot) which made white 1 dot write to black solid with a personal computer was produced, and an outputted image printed out by transmitting this data to said experimental aircraft via a printer interface was observed. It measured like the evaluation 2 about the attenuating light characteristic of a photo conductor of Embodiment 9 and the comparative examples 5 and 6.

[0121]About a photo conductor of Embodiment 8, a flake of 1 dot has checked clearly on black solid. It turned out that the photo conductor of Embodiment 8 can output sufficient high resolution images. The attenuating light characteristic of a photo conductor of Embodiment 9 has a small attenuating light to weak exposure, as shown in the photo conductor E of drawing 8, but an attenuating light to strong exposure has hit the ceiling a little.

It turned out that there is little improvement in sensitivity from the comparative example 5. The attenuating light characteristic of a photo conductor of the comparative example 5 was understood that an attenuating light is large also by weak exposure, as shown in the photo conductor F of drawing 8. When a picture was examined about a photo conductor of the comparative example 5, in spite of having sent data to which a dot is made to output, an outputted picture serves as black solid and it became clear that a dot was not formed exactly. The attenuating light characteristic of a photo conductor of the comparative example 6 was understood that strong exposure of an attenuating light is also insufficient as shown in the photo conductor G of drawing 8, and rest potential is large. When a picture was examined about a photo conductor of the comparative example 6, a dot of an outputted picture could be

distinguished, but concentration of a black solid portion was low.
[0122]By providing the photosensitive layer containing a crystalline phthalocyanine composition more specific than the above result, Also to small exposure energy, weak exposure instead of the photo conductor (comparison photo conductors C and F) which is high sensitivity has few attenuating lights, and the high sensitivity photo conductor (photo conductors A and B) which carries out potential attenuation thoroughly by high sensitivity and which answers linearly to exposure energy can be provided to strong exposure.
[0123]Since it is high sensitivity also to exposure energy with the more powerful photo conductor A, the photo conductor E shows that the effect made into the purpose in this invention is demonstrated with the charge transporting material which has specific high mobility. That is, the electrophotographic photoreceptor with which it is more satisfied of all high sensitivity, the high definition, and high resolution is producible with this charge transport material.
[0124]
[Effect of the Invention]By using the crystalline phthalocyanine composition which has said specific X diffraction spectrum as charge generating material into a photosensitive layer according to this invention, weak exposure has few attenuating lights and to strong exposure by high sensitivity. Potential attenuation is carried out thoroughly, and as a result of being able to obtain the high sensitivity photo conductor which answers linearly to exposure energy, the electrophotographic photoreceptor with which it is satisfied of all high sensitivity, the high definition, and high resolution can be provided.
[0125]In the electrophotography device using [using a semiconductor laser or a light emitting diode (LED) as an exposure light source] a reversal development process according to this invention, By carrying said electrophotographic photoreceptor, the electrophotography device with which it is satisfied of all high sensitivity, the high definition, and high resolution can be provided.

[Translation done.]